CLAIMS

1. A mechanical component composed of a steel and surface-hardened by nitriding,

having a Vickers hardness of the surficial portion measured at a reference position corresponded to a 50 μm depth from the surface of said mechanical component of 340 to 460 HV, having a Vickers hardness of the inner portion being not affected by the nitriding and showing a nearly constant hardness of 190 to 260 HV, and having an effective depth of hardened layer measured from the surface of said component, where a Vickers hardness of 270 HV is achieved, of 0.3 mm or more.

2. The mechanical component as claimed in Claim 1,

having compositions of the individual constituent elements adjusted so as to limit Cr[eq.] to 0.72% or more and 1.0% or less, and C[eq.] to 0.65% or more and 0.86% or less, under definitions of

Cr[eq.]=0.475×C+0.164×Si+0.241×Mn+Cr

C[eq.]=C+0.07×Si+0.16×Mn+0.19×Cu+0.17×Ni+0.2×Cr, and

having a hardness distribution profile H(x), which is given by plotting, on H-x plane, Vickers hardness H measured in the depth-wise direction x as viewed from the component surface, fallen in region Z expressed by the equation (1) below:

$$H'(x) = H'0 + (H'1 - H'0) \times \left[1 - \mathrm{erf}\left(\frac{x}{2\sqrt{\alpha Dt}}\right)\right] \quad \cdots(1)$$

where,

$H'0=C[eq.]\times 254+33.8$

$H'1=Cr[eq.]\times 392+65.8$

Cr[eq.]: chromium equivalence described in the above

C[eq.]: carbon equivalence described in the above;

$$D = D_0 \times \exp\left(\frac{-Q}{R\times(T+273)}\right)$$

D_0: 1.13×10^{-6}

$$Q : 83\times\left(1-\frac{14.03}{T+273}\right)\times 1000$$

R: 8.314;

$\alpha=\exp(-1.47\times Si-0.918\times Mn+0.998)$

Si : Si content (wt%)

Mn: Mn content (wt%); and

region Z is defined as a region in which H'(x) expressed by the equation (1) can move on the H-x plane while satisfying a condition of $H'(0.3\times10^{-3})\geqq 270$, when t varies from 3.6×10^{3} to 18×10^{3} and T varies from 500 to 650.

3. The mechanical component as claimed in Claim 2, having, in % by weight, an Fe content of 90% or more, and containing constituent elements with the individual contents of C: 0.35 to 0.5%, Si: 0.01 to 0.3%, Mn: 0.6 to 1.8%, Cu: 0.01 to 0.5%, Ni: 0.01 to 0.5%, Cr: 0.01 to 0.5%, Al: 0.001 to 0.01% and N: 0.005 to 0.025%.

4. The mechanical component as claimed in Claim 3, containing any one species, or two or more species of constituent elements with the individual contents, in % by weight, of Pb: 0.30% or less, S: 0.20% or less, Ca: 0.01% or less, Bi: 0.30% or less, Ti: 0.02 or less, Zr: 0.02% or less and Mg: 0.01% or less.

5. The mechanical component as claimed in any one of Claims 1 to 4, wherein said mechanical component is a crank shaft.

6. A method of fabricating a mechanical component composed of a steel and surface-hardened by nitriding,

said nitriding being carried out so as to adjust Vickers hardness of the surficial portion measured at a reference position corresponded to a 50 μm depth from the surface of said mechanical component to 340 to 460 HV, so as to adjust Vickers hardness of the inner portion being not affected by the nitriding and showing a nearly constant hardness to 190 to 260 HV, and so as to adjust an effective depth of hardened layer measured from the surface of said component, where a Vickers hardness of 270 HV is achieved, to 0.3 mm or more.

7. The method of fabricating a mechanical component as claimed in Claim 6, wherein compositions of the individual constituent elements are adjusted so as to limit Cr[eq.] to 0.72% or more and 1.0% or less, and C[eq.] to 0.65% or more and 0.86% or less, under definitions of

$Cr[eq.]=0.475\times C+0.164\times Si+0.241\times Mn+Cr$

$C[eq.]=C+0.07\times Si+0.16\times Mn+0.19\times Cu+0.17\times Ni+0.2\times Cr$, and

said nitriding is carried out by gas soft nitriding or salt-bath nitriding under conditions of a process time of 3.6×10^3 to 18×10^3 seconds, and a process temperature of 500 to 650°C.